Acids and Bases

Acids

- An acid is a substance that:
  - Tastes sour (dangerous)
  - Oily feeling (dangerous)
  - Reacts with metals and carbonates
    - Corrosive
  - Turns blue litmus paper red
  - All contain Hydrogen
    - Anything beginning with H is acid except water (H_2O) and peroxide (H_2O_2)

Acids

- Caution:
  - Wash with water if it gets on you
  - Never smell
  - Don’t pour water into acid
  - Don’t taste!!

- Common Acids
  - Lactic Acid = Buttermilk
  - Acetic Acid = Vinegar
  - Citric Acid = Oranges
  - Carbonic Acid = Cokes (carbonated water)

Bases

- A base is a substance that:
  - Tastes bitter (dangerous)
  - Slippery feeling (dangerous)
  - Dissolves fats, oils, wool, & hair (lye)
  - Turns red litmus paper blue
  - Neutralizes acids to form salt and water.
  - All have Hydroxides (OH)

Bases

- Common Bases
  - NH_4OH = Ammonia
  - $NaOH$ = Lye
  - $Mg(OH)_2$ = Milk of Magnesia, Rolaids, Tums
  - $NaHCO_3$ = Sodium Bicarbonate: Baking Soda

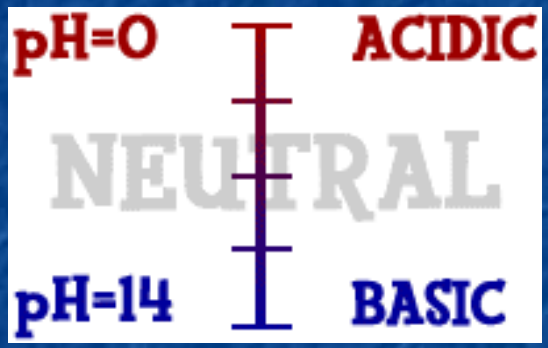
pH stands for “power” of hydrogen or “potential” hydrogen

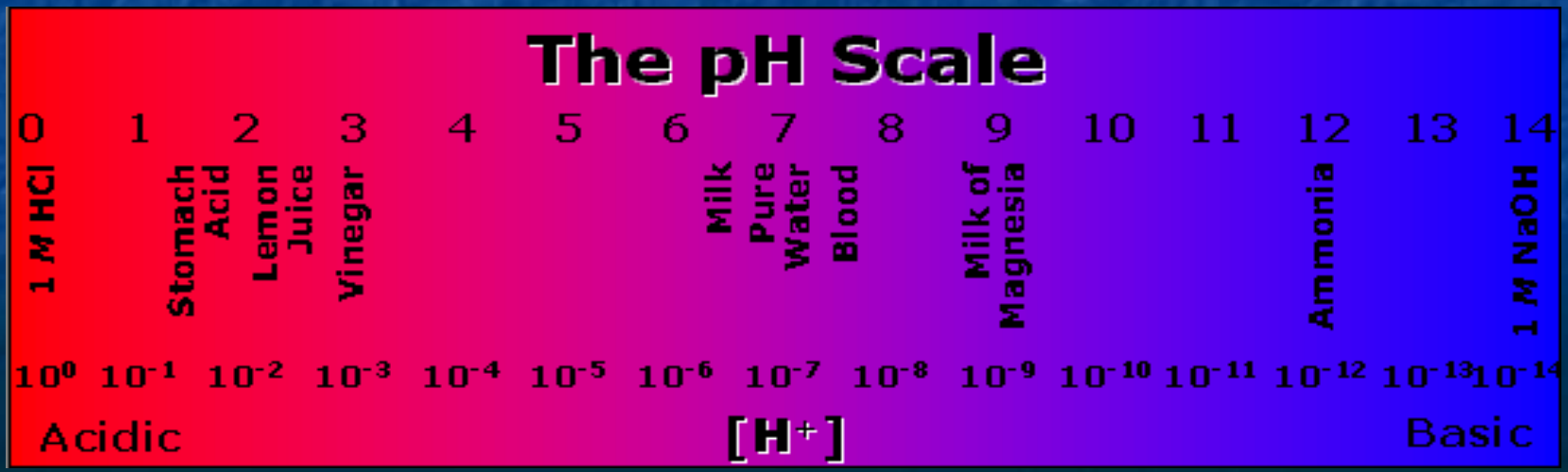
The exact meaning of the "p" in "pH" is disputed, but according to the Carlsberg Foundation pH stands for "power of hydrogen".

There are also other meanings, "p" stands for the German *Potenz* (meaning "power"), others refer to French *puissance* (also meaning "power", based on the fact that the Carlsberg Laboratory was French-speaking). Another suggestion is that the "p" stands for the Latin terms *pondus hydrogenii*, *potentia hydrogenii*, or potential hydrogen

pH Scale

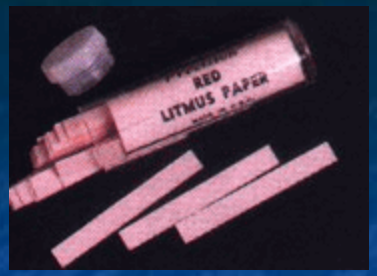
- The pH scale is a range of values from 0-14 that tells the concentration of Hydrogen ions in a solution.
- 0 = Most Acidic
- 7 = Neutral
- 14 = Most Basic





pH scale

Each number goes up by a power of 10. So a change of 1 unit is 10 times as much. 2 is 100 times greater. 3 is 1000 times greater and 6 is 1, 000,000 times greater.



Indicators

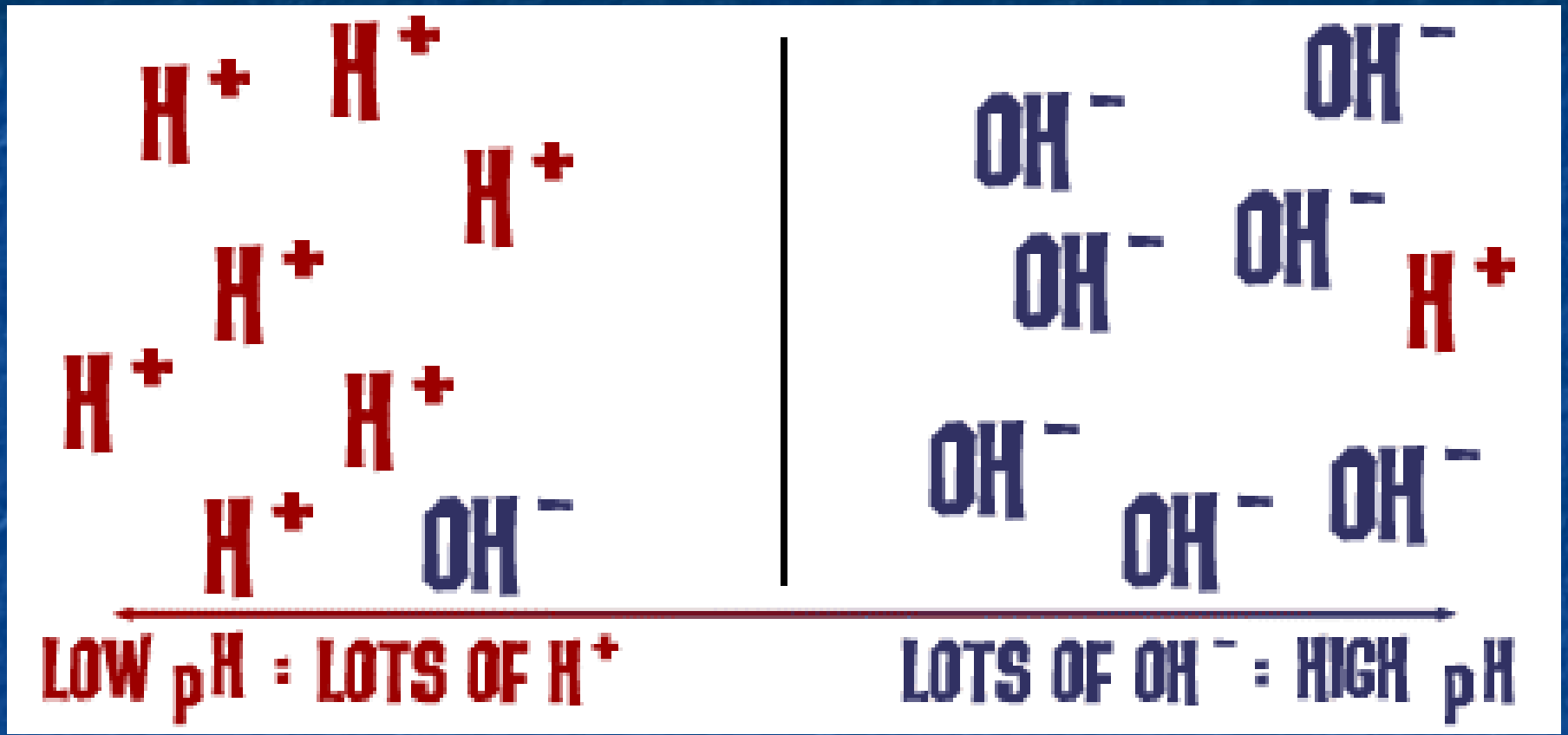
- Litmus Paper
  - Acids: blue litmus paper RED
  - Bases: red litmus paper BLUE
- Phenolphthalein
  - Bases turn pink
- Cabbage Juice
  - Acids: pink/purple
  - Neutrals: blue
  - Bases: green
- Beet Juice
  - Acids: red
  - Bases: purple

Chemical Indicators are a safe way to determine if a substance is acidic or basic.

Chemical indicator	**Color in acid**	**Color in base**
Litmus paper	Pink	Blue
Phenolphthalein	Colorless	Pink/ violet
Bromothymol blue	Yellow	Blue

Indicators change color with the pH

Universal indicator is a solution which changes colors due to the pH. You compare the color of the solution with the pH chart. Universal indicator is paper that has been covered in universal indicator solution. It will change colors to match the pH of the material being tested against a scale.



Acids

Bases

What Makes and Acid or a Base?

So what makes an acid or a base? A chemist named Svante Arrhenius came up with a way to define acids and bases in 1887. He saw that when you put molecules into water, sometimes they break down and release an H+ (hydrogen) ion. At other times, you find the release of an OH- (hydroxide) ion. When a hydrogen ion is released, the solution becomes acidic. When a hydroxide ion is released, the solution becomes basic. Those two special ions determine whether you are looking at an acid or a base